



PATENT SPECIFICATION

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209,567

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PROVISIONAL SPECIFICATION.

Improvements in Piston and like Packing Rings.

I, JOHN CHILTON, British subject, of Ivy Cottage, Anchor Hill, Nuneaton, do hereby declare the nature of this invention to be as follows:—

5 This invention relates to improvements in piston and like packing rings such as are employed to make a fluid or gas tight joint between a piston and the walls of the cylinder in which it slides or between 10 other reciprocating members and their bearings, the object of this invention being to provide an improved construction of ring for this purpose.

According to the present invention my 15 improved ring comprises three rings, *i.e.*, two outer rings and one central one, the latter being suitably engaged with the outer ones so that upon being pressed outwardly by any suitable means it forces 20 the outer rings both outwardly and laterally, thus making a fluid or gas tight joint in all directions as will be hereinafter explained.

By way of illustration I will describe 25 the invention as applied to the piston of a steam engine.

The piston is provided at a suitable point in its length with the usual 30 external parallel-sided groove which accommodates or houses the piston ring. The latter comprises three rings, two outer ones and a central one, the shape of the cross-sectional area of the latter being that of a truncated cone or wedge, 35 the inner periphery of the ring forming the base thereof, while the shape of the cross-sectional area of the outer rings is that of right-angle triangles the outer peripheries and outer faces of the rings 40 forming the right-angled sides of the triangles and respectively engage the walls of the groove and the walls of the cylinder in which the piston slides, while the inner peripheries of the rings form 45 the other sides of the triangles and engage the inclined sides of the central.

ring. Thus, by pressing the central ring outwardly as will be hereinafter described, the two outer rings are forced against the cylinder walls and also 50 against the walls of the groove, so that the steam in the cylinder cannot pass either in front of or behind the piston ring.

All three rings may be constructed of 55 resilient material and split transversely at one point thus enabling them to be expanded, but it is preferred to construct each of the rings in quadrantal segments so that when expanded an even pressure 60 is obtained throughout the whole length of the rings.

The central ring segments are pressed 65 outwardly by a series of spring-influence rollers. Around the base of the groove housing the rings is a series of radial holes or sockets each having an open ended socket member slidably mounted therein. The open end of each slidable socket is disposed innermost and between 70 the base of the hole in the same and the base of the hole in the piston a coiled spring is mounted which normally tends to press the slidable socket outwards. The outer face of the closed end of the 75 socket is provided with a semi-cylindrical recess in which a roller is mounted which bears against the inner periphery of the central ring. These socket members are equally arranged around the 80 piston so that an even pressure is exerted upon the central ring which forces the same outwardly thus causing the outer rings to firmly and closely bear against 85 the walls of the cylinder and the walls of the groove in the piston.

If desired, the ends of the segments of 90 the rings may be cut away or bevelled to form wedge-shaped transverse grooves into which wedge or triangular shaped members are adapted to be forced to assist in pressing the segments outwardly.

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The latter members would be provided in their bases with hemi-spherical grooves by means of which they would be mounted upon the rollers adjacent the ends of the segments and in this manner pressed outwardly.

The invention may be applied to the pistons of steam and internal-combustion engines and also to packing rings for any

other reciprocating members requiring a fluid or gas tight joint. In this latter application the rings may be mounted in grooves in the bearings for the members instead of in the members themselves.

Dated this 28th day of November, 1922.

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COMPLETE SPECIFICATION.

Improvements in Piston and like Packing Rings.

I, JOHN CHILTON, British subject, of
20 Ivy Cottage, Anchor Hill, Nuneaton, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following
25 statement:—

This invention relates to piston and like packing devices of that type comprising a pair of rings divided transversely at one or more points and arranged side by side within the same groove around the piston, the said rings being adapted to be forced laterally against the sides of the groove within which they are fitted by an intermediate transversely-divided pressure ring of a wedge section forced outwards by springs or spring-influenced plungers, the inclined sides of the intermediate ring engaging against the adjacent sides of the outer rings.

40 The object of the present invention is to provide improved means for forming a steam or gas-tight joint between the ends of the three rings or between the ends of the segments thereof, the said means also serving to force the rings or the ring segments radially outwards against the walls of the piston.

According to this invention the two outer rings and the inner wedge-sectioned pressure ring are divided transversely at corresponding points, the corresponding ends of the rings, or of each set of laterally-situated ring segments, having inclined faces disposed in the same plane 50 and engaged by and closely fitting against, the same inclined face of a spring-influenced wedge member which latter serves to form a steam or gas-tight joint between the opposed ends of the rings, or between the opposed ends of adjacent sets of ring segments, and also serves to force the rings or ring segments radially outwards. The wedge member is preferably forced outwards between the 55 opposed ends of the three rings or of adjacent ring segments by a spring-influenced plunger, an anti-friction member or roller being disposed between the

latter and the said wedge member. The inner pressure ring, or the inner pressure ring segments may also be forced outwards by spring-influenced plungers, with rollers or anti-friction members disposed between the plungers and the inner periphery of the inner pressure ring or of the inner pressure ring segments.

It has been proposed to employ a pair of rings arranged side by side in the same groove, and to divide them transversely at one or more corresponding points, the corresponding ends of the rings or of the ring segments being inclined and engaged by the inclined face of a spring influenced wedge member. In this case, however, no intermediate wedge-sectioned ring has been employed. According to this invention each inclined face of the wedge member engages not only against the adjacent ends of the two outer rings or ring segments but also against the end of the intermediate ring or ring segment.

Figure 1 of the accompanying drawings represents an elevational view of the piston of a steam engine fitted with a packing device of the type referred to in which the three rings are divided into a number of segments, the joints between the opposed ends of which are rendered steam-tight, and the segments forced radially outwards, by means in accordance with this invention.

Figure 2 shows a cross-section through same.

Figure 3 represents a cross-section through the piston, showing the middle ring or pressure member sections in side elevation.

Figure 4 shows clearly the manner in which each section of the spring-influenced pressure member fits between the corresponding sections of the two piston rings.

Figure 5 shows the said ring and pressure member sections separated.

Figure 6 is a view of one of the plungers, together with its spring and roller, for operating the pressure member, the said parts being shown separated.

Figure 7 illustrates the wedge member whose inclined faces engage the corresponding ends of the piston ring and pressure member segments, the view also showing the spring, plunger and roller, all of the said parts being shown separated.

Figure 8 represents a sectional view of a modified arrangement in which the piston rings and pressure member are divided transversely at one point only, instead of being divided into a number of sections.

Figure 9 is a cross-section through the rings of this modified arrangement, showing one of the spring plungers, & the roller carried thereby.

The same reference numerals indicate corresponding parts in each of the figures.

Referring to Figures 1 to 7 of the drawings, which show one form of the invention as applied to the piston of a steam engine, the piston 1 is provided with the usual peripheral piston ring groove 2 which is formed with deep parallel sides or flanges. Fitted within this groove are two piston rings 3 and 4 which are arranged side by side and which are of a combined width which is slightly less than that of the said groove 2. Each of these rings 3 and 4 is of a triangular section, their opposed sides or faces being inclined and diverging away from one another towards their inner periphery, their opposite sides are, on the other hand, straight and lie parallel to the sides or flanges of the groove 2, whilst their outer peripheries lie at right-angles to these sides and are adapted to engage with the cylinder wall. Fitted between these two piston rings 3 and 4 is a third ring or pressure member 5 which is of a wedge-shaped cross-section, having inclined sides adapted intimately to engage against the inclined sides of the said piston rings 3 and 4, whilst its inner periphery which is concentric with the periphery of the piston 1 lies slightly inwards of the inner peripheries of the piston rings 3 and 4. The latter, together with the said middle pressure ring 5, are all divided at corresponding points into a number of equal segments, the opposed ends of adjacent segments of each ring being inwardly inclined or bevelled so as to leave between them a triangular or wedge-shaped space the wider portion or base of which lies nearest the centre of the piston 1, whilst its apex is formed by the extremities of adjacent segments which are slightly separated. The inclined or bevelled ends of the corresponding segments of the piston rings 3 and 4 and of the intermediate pressure ring 5 lie substantially flush with one another or in the same plane. Disposed around the bottom of the groove 2 in the piston 1, and arranged at equal distances apart, are a number of radial holes or recesses 6 within each of which is housed a coiled spring 7. Each spring engages within the tubular inner end of a plunger 8 arranged to fit within the hole 6 so that the spring 7 tends to force the plunger outwards. The outer end of each plunger 8 is formed with a head having a transverse groove or seating 9 disposed parallel to the axis of the piston 1 and within which is fitted a roller 10. Two of the springs 7, together with their plungers 8 and rollers 10 are preferably disposed beneath the main portion of each set of piston ring and pressure ring segments, the arrangement being such that the rollers 10 engage with the underside of the middle segment, that is the segment of the pressure ring 5, which segment, as previously stated, lies slightly inwards of the two outer segments of the piston rings 3 and 4. The said springs 7 tend, through the medium of their plungers and rollers, to force the segment of the pressure ring 5 outwards so that the inclined sides of the said segment are forced against the co-operating inclined sides of the corresponding segments of the piston rings 3 and 4. The said piston ring segments are thus forced apart against the walls of the groove 2 in the piston, and are also forced outwards into intimate contact with the walls of the cylinder (not shown), the whole of the segments of the piston rings 3 and 4 being forced laterally and outwardly in a similar manner. As the piston ring segments are forced outwards by the spring-influenced segments of the pressure ring 5 the opposed ends of the segments are caused to separate, and in order to ensure a steam-tight joint being formed at these points a wedge-shaped member 11 is arranged to engage between the ends of adjacent sets of segments, its inclined sides being in contact with the adjacent bevelled or inclined ends of the latter both the ring & pressure member segments. Each of these wedge members 11 is likewise forced outwards by a coiled spring 7, housed in a hole or recess 6 in the bottom of the groove 2, through the medium of a plunger 8 and roller 10 arranged in a similar manner to the above described, the roller 10 being arranged to fit within a semi-circular-sectioned groove 12 running transversely across the base of the wedge member, as shown. Each wedge member owing to being forced outwards not only assists to force the

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segments of the piston rings 3 and 4, and of the pressure ring 5, outwards, but also automatically closes the space between the ends of adjacent sets of 5 piston and pressure ring segments, as the said ends are separated due to their being forced outwards.

As above stated the segments of the 10 piston rings 3 and 4 are automatically forced apart by the spring-influenced segments of the pressure ring 5 so that they always engage against the walls of the groove 2 in the piston and take up any wear in the latter, whilst they are 15 also forced outwards by the segments of the pressure ring 5 against the cylinder walls, the piston ring segments being assisted in being forced outwards by the spring-influenced wedge members 11, which, as above stated, also serve the 20 purpose of closing the gap between their opposed ends and between the ends of the pressure ring segments. A preferably steam-tight joint is thus always 25 obtained. After a certain amount of wear has taken place the apices of the wedge members 11 may come level with the outer peripheries of the sections of the piston rings 3 and 4 when they would 30 wear with the latter, and always lie flush with same, whilst in course of time the sections of the pressure ring 5 may come level with the outer peripheries of the piston ring sections and would then likewise wear with the latter.

Referring to the arrangement shown in Figures 8 and 9 of the drawings; instead of the piston rings 3 and 4 and the inner pressure ring 5 being formed in a number 40 of segments as above described they may be divided transversely at a single point, as shown. In this arrangement a single spring-influenced wedge member 11 only is necessary, being arranged between the 45 opposed ends of the piston and pressure rings 3, 4 and 5, which ends are inclined or bevelled so that they all engage closely with the respective inclined sides of the said wedge-member. The latter is forced 50 outwards by a coiled spring 7 through the medium of a plunger 8 and roller 10 so that the wedge-member always forms a steam-tight joint between the ends of the three rings, and also assists to force same outwards. The piston rings 3 and 55 4 are mainly forced outwards by the intermediate wedge-sectioned pressure ring 5 by the other springs 7, through the medium of the plungers 8 and rollers 60 10 which are provided, the pressure ring 5 also forcing the piston rings 3 and 4 laterally into engagement with the sides of the groove 2 in the piston 1.

In any of the above arrangements the 6 pressure ring, or the pressure ring segments, may be forced outwards by any suitable form or arrangement of springs, which may, if desired bear directly upon the said ring or ring segments; the wedge member or members may similarly be influenced by any form of spring or springs which may bear directly thereon.

Although the invention has been 7 described in connection with the piston of a steam engine, it may be applied equally to the pistons of internal combustion engines, or to other pistons, or to any movable member where a fluid or gas-tight joint is desired.

Having now particularly described and 8 ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A packing device of the type referred to for pistons and the like, in which the two outer rings and the inner pressure ring are divided transversely at corresponding points, the corresponding ends of the three rings, or of each set of three laterally-situated ring segments, having inclined faces disposed in the same plane and engaged by, and closely fitting against, the same inclined face of a spring-influenced wedge member, which latter serves to form a steam or gas-tight joint between the opposed ends of the rings or ring segments, and also serves to force the rings or ring segments outwards, substantially as described.

2. A packing device as claimed in 10 Claim 1; in which the wedge member is forced outwards between the opposed ends of the three rings or of adjacent ring segments, by a spring-influenced plunger, an anti-friction member or roller being disposed between the plunger and the inner face of the said wedge member, substantially as described.

3. A packing device as claimed in 11 Claim 1 or 2; in which the inner pressure ring or pressure ring segments, are forced outwards by spring-influenced plungers, anti-friction members or rollers being disposed between the said plungers and the inner periphery or face of the pressure ring, or pressure ring segments, substantially as described.

4. The improved obturator or packing device substantially as herein described and set forth by the accompanying drawings.

Dated 3rd day of July, 1923.

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Agents for Applicant.

[This Drawing is a reproduction of the Original on a reduced scale]

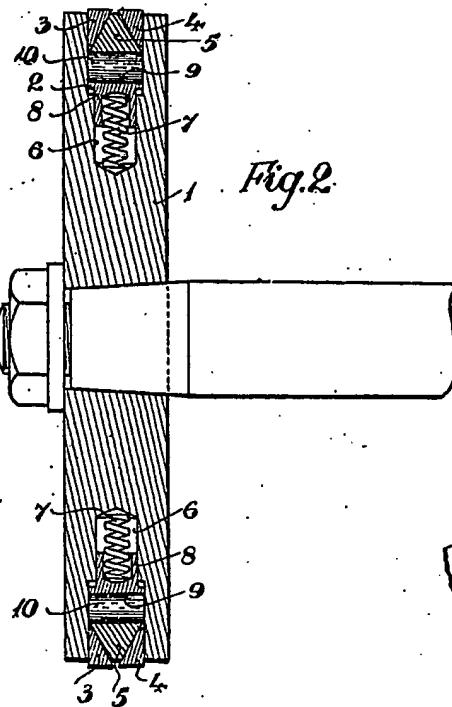
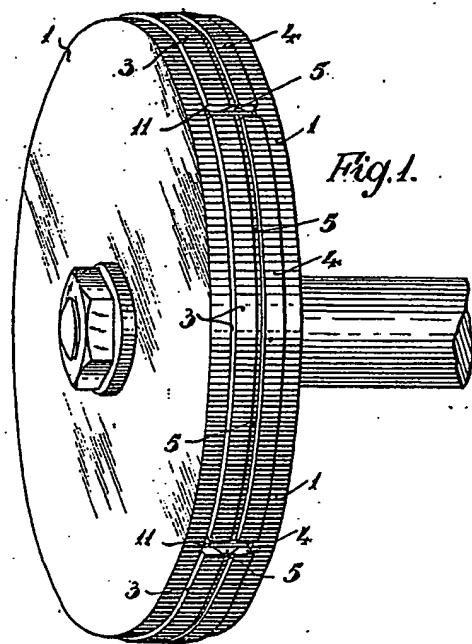
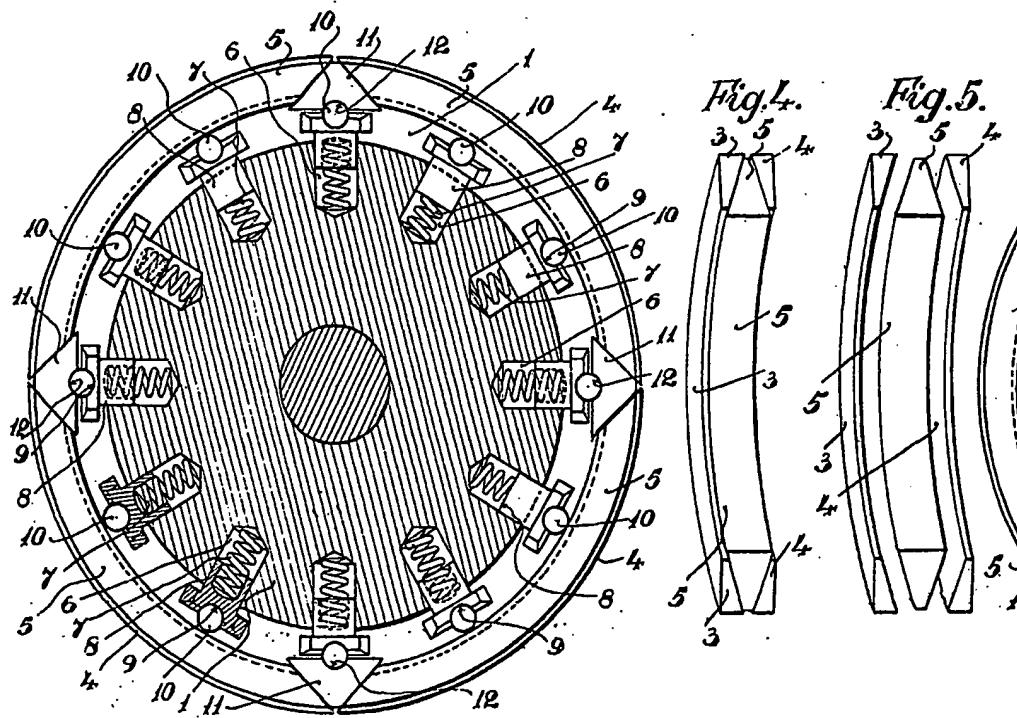
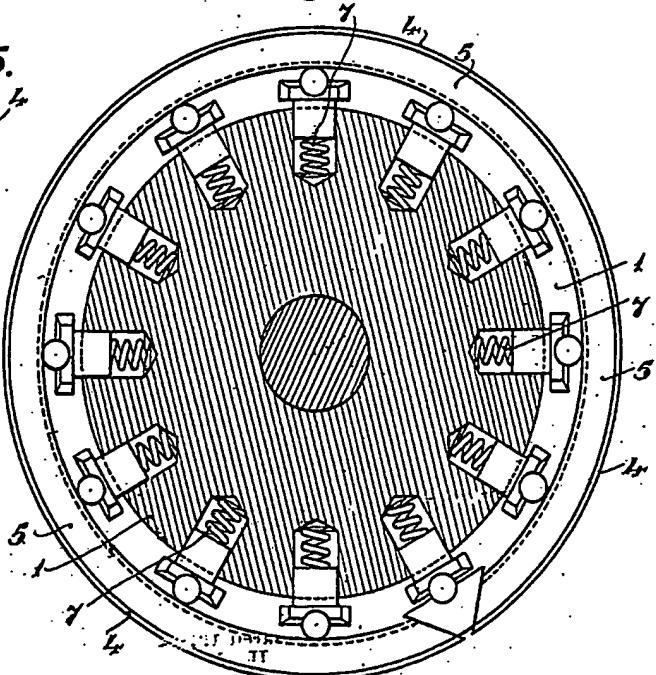
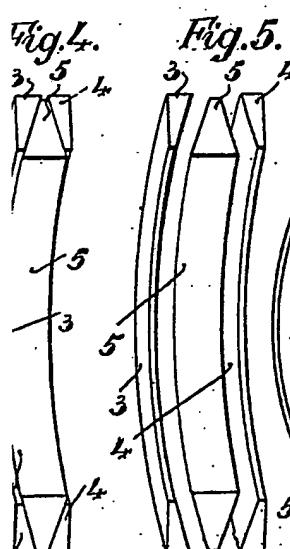
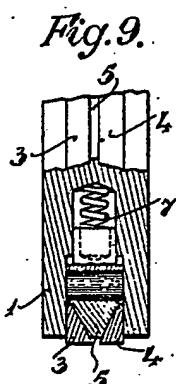
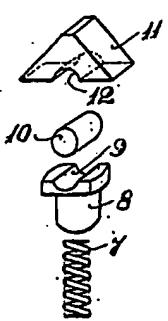
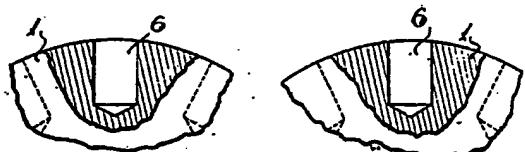
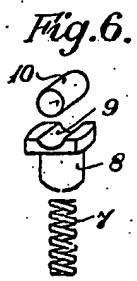
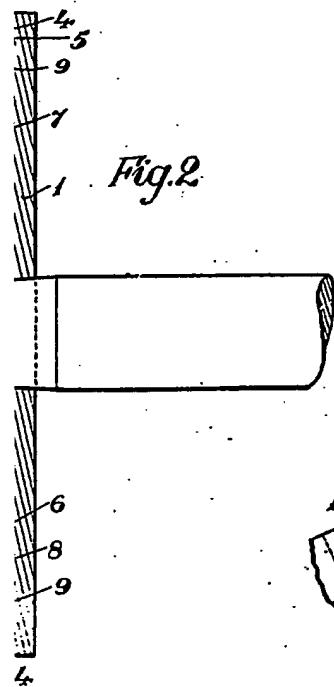
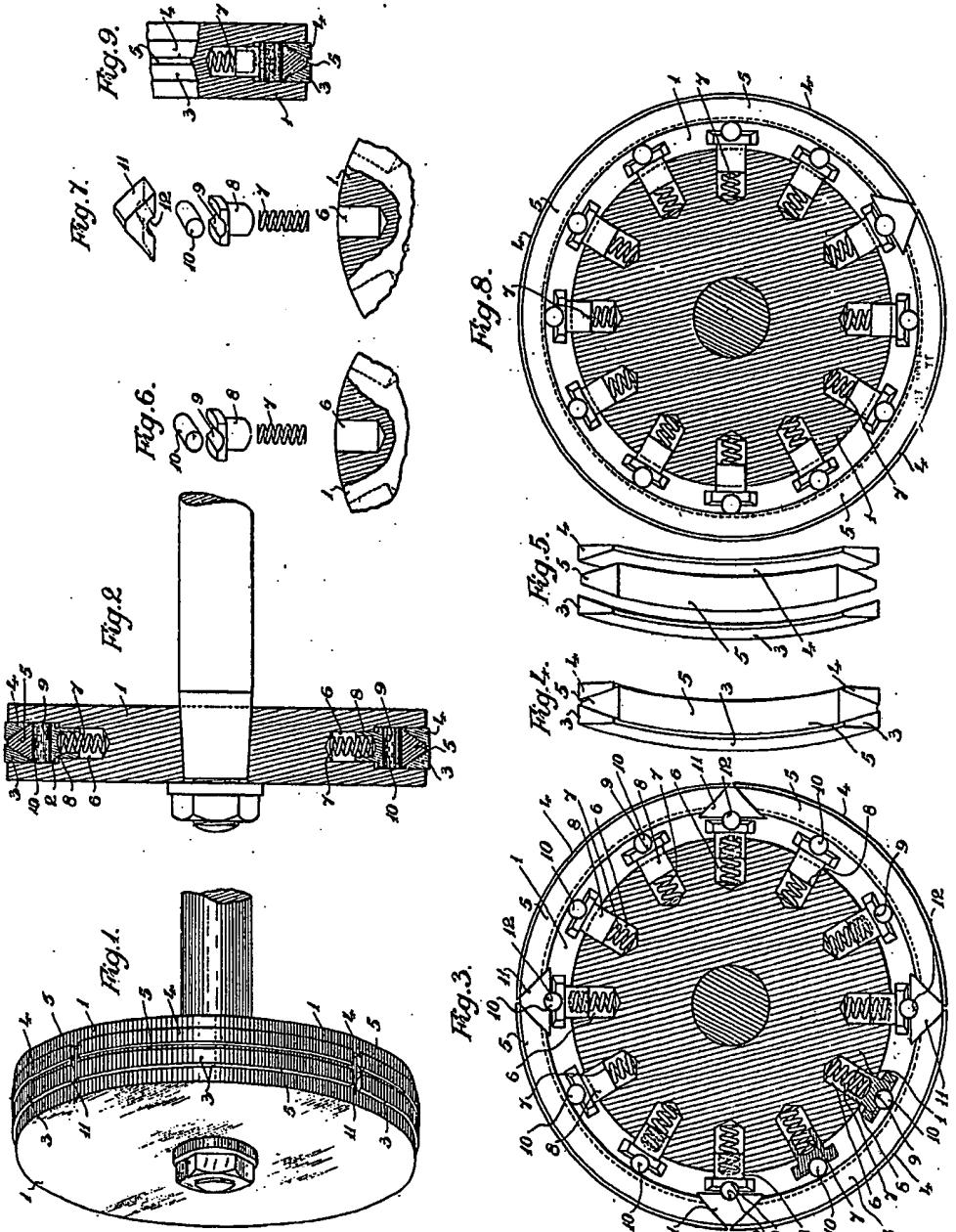


Fig. 3.







[This Drawing is a reproduction of the Original on a reduced scale]